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UNCLASSIFIED INFORMATION ON SOVIET  
BLOC INTERNATIONAL GEOPHYSICAL COOPERATION  
- 1960

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INTERNATIONAL GEOPHYSICAL COOPERATION PROGRAM --  
SOVIET-BLOC ACTIVITIES

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## I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

### Soviet Engineer Concludes that Television Earth Satellite Systems Now Technically and Economically Feasible

An excellent 2,000-word article in a Soviet technical journal describes details of several systems of earth satellites for the relay-ing of television signals.

The article, accompanied by a 3-item bibliography, makes a number of references to American writings on this subject. Soviet and American analysis of the problem, the author notes, indicates that we now have the technical know-how to establish such systems and that it is economically feasible to do so. Besides being useful for long-range radio and television transmission, they also offer possibilities for communication with future spaceships and transmission of television images from other planets. ("Television Earth Satellites," Engineer V. Litvinenko, Nauchno-Tekhnicheskiye Obshchestva USSR, No. 6, 1960, pp. 23-27)

### Soviet Article Reviews the Subject of Cosmic and Terrestrial Magnetism

The following are excerpts from a 1,500-word article on cosmic and terrestrial magnetism appearing in the newspaper "Pravda Ukrayny" on 17 May 1960.

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The information recently acquired in respect to the Earth's magnetic field has shown the importance of studying celestial as well as terrestrial electromagnetic phenomena. For such work the Lenin Prize has been awarded to S. N. Vernov, A. Ye. Chudakov, N. V. Pushkov and Sh. Sh. Dolginov for the discovery and investigation of the Earth's outer radiation belt and the investigation of the magnetic fields of the Earth and Moon.

The Earth's outer magnetic field extends outward for immense distances -- as much as 100,000 km. The gigantic network of invisible lines of force plays the role of a singular "dispatcher" for the electrically charged particles which bombard our atmosphere. As a result of such bombardment (principally by charged particles of solar origin) and continual exposure to the ultraviolet light of the Sun, the majority of air particles above 100 km are ionized.

The ionosphere, like a seething ocean, is in a state of constant change and motion. The motion of charged particles in the magnetic field leads to the appearance of electrical currents. The magnetic fields of these currents distort the Earth's magnetic field. We live at the bottom of this seething ocean of electricity.

By the use of artificial satellites and geophysical rockets it has been determined that the boundaries of the ionosphere extend out to almost 3,000 km; the concentration of charged particles therein is greater than previously believed. The magnetometers of Soviet cosmic rockets have discovered new and very interesting structural peculiarities of the geomagnetic field. It has been experimentally confirmed that there is an electrical current flowing around the entire Earth at a great distance from its surface.

Satellites and cosmic rockets help us to explain not only the outer but also the inner structure of the Earth's magnetic field. We need to know this for the solution of many problems in geology and geophysics and (eventually) for understanding the origin and evolution of our planet.

The study of cosmic rays, in combination with other astrophysical observations, makes it possible to speak with assurance of the existence of a giant magnetic field in our galaxy. Evidently the intensity of this field is not great; in dimensions the field is greater than the visible galaxy. As a result there is an "aureole" surrounding the galaxy -- an atmosphere of very widespread charged particles. The dimensions of the "aureole" -- a hundred thousand light years.

Soviet scientists have shown that the flare-ups of novae and supernovae are the sources of cosmic rays. Flare-ups in such stars are accompanied by an increase in their brightness by thousands or millions of times and the simultaneous "casting off" of their surface layers. As a result of thermonuclear reactions or some other still unknown process a gigantic amount of energy is liberated. Study of these phenomena helps us to solve important problems of the physics of cosmic rays, the origin of the chemical elements, the "birth" of stars and galaxies and many others.

By spectroscopic methods the American scientist Babcock has succeeded in discovering a great number of magnetic stars whose magnetic fields cannot even be compared with that of our Sun. Whereas on the surface of the Sun and Earth the intensity of the total magnetic field is 0.5 to 1 gauss, in magnetic stars it is several thousand gauss. This means that their magnetic energy exceeds the magnetic energy of the Sun by millions of times!

It is interesting to note that the magnetic fields of many stars are variable. In just a few hours the intensity changes from +6,000 to -6,000 gauss. The magnetic storms of the Sun and Earth cannot even be compared with the magnetic "hurricanes" prevailing in the atmospheres of these stars.

Solution of these problems, the article concludes, will be useful in bringing about controlled thermonuclear reactions. An effort is being made at this time to reproduce in miniature those processes which are observed in outer space. ("Cosmic and Terrestrial Magnetism," by V. Ivanchuk, Pravda Ukrainsk, 17 May 1960, p. 3)

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## II. UPPER ATMOSPHERE

### Further Report on the Pulkovo Television Telescope

Several years ago a photograph appeared in many newspapers; it showed a television set on whose screen one could see part of the Moon with its craters and seas. This was the result of the first experiments made by the Pulkovo astronomer N. F. Kuprevich who had attached a television camera tube to his telescope.

By use of the experimental telescope at Pulkovo it has proven possible to use television tubes in astronomy. In lunar observations the brightness of the image was 500 to 600 times greater than the image resulting from the use of the telescope's optical system. It proved possible to use short exposures when photographing the television screen.

The mechanical parts of the new television telescope developed by N. F. Kuprevich have been fabricated in the workshops of the Pulkovo Observatory. The television telescope will be equipped with a number of automatic devices which will considerably improve the image of the luminary on its screen. At the present time the construction of a new pavilion for the new instrument on Pulkovo Hill is almost completed. ("Planets on the Screen of a Television Set", Sovetskaya Aviatsiya, 24 June 1960, p. 1)

### Brief Article on Appearances of Meteors in the USSR

"Patrol" observations of the appearance of fireballs were made at Ryazan beginning in 1956. Between 27 July and 28 August 1959 five fireballs were observed -- a record monthly number for the last year; during the first nine months of 1959 there were ten sightings.

The coordinates for the beginning and ending of the meteor trails were determined by using the telescopes used for the observation of artificial earth satellites (the telescopes carried horizontal and vertical circles) and the star atlas prepared by A. A. Mikhaylov. The brightness was estimated by the method of applying the scale of stellar magnitudes; this facilitated photometric observations of changes in the brightness of planets and individual details on the Moon's surface.

The maximum stellar magnitude of the fireballs ranged from minus 2 to minus 6; thus it sometimes exceeded the maximum brightness of Venus. Fireballs are white or bluish-white. These remained visible from 1 to 2 seconds; the total length of the visible trail was from  $10^{\circ}$  to  $50^{\circ}$ ; the average for all five fireballs was about  $25^{\circ}$ .

On 27 July 1959 at 0049 hours a fireball appeared in the vicinity of the constellation Pegasus and died out in the constellation Andromeda (observed by V. I. Kuryshov); on 28 July at about 0100 hours a fireball flew out of the constellation Pegasus and died out in the constellation Swan (observed by Ye. B. Gusev). On another day in August at 2358 hours a fireball passed through the constellations Capricorn and Sagittarius (described by Ye. B. Gusev). On 26 August at 2025 hours a slow-moving

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fireball appeared in the east-southeast in a large gap in the clouds (described by V. I. Kuryashev). On 28 August at 0237 hours V. A. Stepunin observed the flight of a fireball from the handle of the dipper of the constellation Great Bear to the constellation Veronica. The height at which the fireballs appeared varied from 30 to 55° above the horizon; two of them ascending, three descending (extinction occurred 10 to 15° above the horizon). Three fireballs had trails from 7° (1 August) to 40° (8 July) in length. In two cases out of the five blinding white flashes were observed (27 July -- at the end of the trail, 1 August -- in the middle of the trail). No sound effects were observed.

Valuable data on meteoric astronomy and fireballs can be provided by the personnel of optical stations that are making observations of artificial earth satellites in the "patrol" service. ("Bright Fireballs," by V. I. Kuryashev (Candidate in Physical-Mathematical Sciences), Priroda, No. 4, 1960, p. 113)

#### The Loss of Mineral Salts from the Earth into Outer Space

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"A quarter of the Earth's surface is covered by soils that are super-saturated with mineral salts; these are unfavorable for agriculture. The fate of these salts is very interesting."

"As a result of precipitation and runoff in rivers these salts gradually pass from the continents into the world ocean. Their concentration in the world ocean gradually increases. Their concentration a half-billion years ago was fourteen parts per thousand, at the end of the Paleozoic era, that is, 185 million years ago, there were twenty-six parts per thousand, and at the present time it has already increased to thirty-five."

"This has occurred despite the fact that a considerable quantity of these salts are constantly being lost from the world ocean. A part of them again appears on dry land and another part is lost into space. This is evidently the reason why the instruments of the Soviet cosmic rocket discovered an aureole of sodium ions surrounding the Earth and extending out almost half the distance to the Moon."

"On the basis of these data Professor V. Borovskiy of the Institute of Soil Science of the Kazakh Academy of Sciences has come to the conclusion that the salts of the continents are constantly, although very slowly, being lost not only into the world ocean, but in part are also being lost into cosmic space." ("Salts Are Being Lost Into Space," Nauka i Zhizn', No. 1, January 1960, p. 70)

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#### Soviet Article Describes the Work of the Institute of Terrestrial Magnetism, the Ionosphere, and Propagation of Radio Waves

A popularly written article appearing in the Ekonomicheskaya Gazeta of 19 June 1960 discusses briefly the various types of research carried on by the Institute of Terrestrial Magnetism, the Ionosphere,

and Propagation of Radio Waves of the Academy of Sciences of the USSR. Some of the work of that Institute is too well known to review here, but the following interesting paragraphs are given in full:

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There is an immense sphere attached to a powerful tripod. This is the ASK-1 automatic ionization chamber. Inside there is another spherical container filled with the inert gas argon. When cosmic rays enter this sphere they are "fixed" by a special sensitive instrument. The entire space between the inner and outer spheres is filled with lead shot. As is well known, lead is a barrier to cosmic particles of relatively low energies. Therefore the "walled-in" small sphere is reached only by cosmic rays having high energies. A spherical "cubic telescope" automatically computes these messengers of the Universe and records them on photographic film.

The radio voice of the Sun is heard for five hours daily at the Institute. Unnoticeable to the eye the antenna of the radio telescope moves after the Sun. The signals of that luminary are received from 1000 to 1500 hours daily on two radio wave bands: 35 cm and 1.5 m. The Sun's radio signals are recorded by a special automatic device. Systematic observations of the Sun show that its activity has now dropped considerably since 1957 -- a year of maximum activity.

The radio astronomers of the Moscow area are closely associated with their colleagues who are conducting similar investigations in Irkutsk, Gor'kiy, Crimea and Kislovodsk. The daily record of the "radio breathing" of the Sun is published in two bulletins -- that of the Academy of Sciences, and one in Geneva ("What the Sun Tells Us," by A. Presnyakov, *Ekonomiceskaya Gazeta*, 19 June 1960, p. 4)

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#### The Thermal Sounding of the Atmosphere

The author of a recent 3-page article in a Soviet scientific periodical deals with the so-called "twilight method" of probing the atmosphere, one of the most attractive indirect methods for studying the structure of the atmosphere. Despite much research devoted to the twilight method he feels that it still remains unclear how promising this method is and whether it should be regarded as a method for study of the structure or optical properties of the upper atmosphere.

Measurements of the brightness of the twilight sky were made in the vicinity of Mount El'brus at an elevation of 3,700 m above sea level.

The results show that the twilight method in its usual form only makes it possible to estimate the mean temperature values. To answer the question as to whether this method offers additional possibilities, experiments are needed which will permit the checking of the method under conditions most favorable for its use. Without a doubt a more effective method is the new twilight method proposed by V. G. Fesenkov. It is believed that considerable progress could be made by photographing twilights in the near-infrared region of the spectrum and the selection of those sectors of the sky in which aerosol scattering exercises a minimum influence. ("On the Problem of the Thermal Sounding of the Atmosphere Using Data from Photometric Observations of Twilight," by K. Ya. Kondrat'yev and O. A. Zigel', *Vestnik Leningradskogo Universiteta*, No. 10, Seriya Fiziki i Khimii, No. 2, 1960, pp. 45-47)

Absorption of Radioactive Elements by Clouds

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"It is difficult to imagine that a cloud may act as a sponge. In reality, however, this is the case. Clouds readily absorb radioactive particles from the upper layer of the Earth's atmosphere. Greatest radioactivity is concentrated in the center of the cloud, as was established by scientific research. The scientists of the Institute of Geology and Geography, Lithuanian SSR designed a special apparatus which works on the principle of a photographic camera, and is set before a plane takes to the air. Investigations of the radioactivity of the atmosphere are of great theoretical and practical value. Scientists are not only able to establish the fluctuations of radioactivity in the surrounding atmosphere, but are able to determine also the possibility of further purifying the air from radioactive particles." ("The Cloud -- a Sponge," [unsigned article]; Moscow, Nauka i Zhizn', No. 4, 1960, p. 7)

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### III. METEOROLOGY

#### Soviets Hold Conference on Aviation Meteorology -- Text from "Sovetskaya Aviatsiya"

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With the development of aviation there took place an increase in the speed of aircraft, their ceilings and range. There was also naturally an increase in the demands placed on meteorology for the servicing of flights. Now thousands of specialists and hundreds of meteorological stations are servicing the air routes of our country. In their compilation of precise predictions they use modern apparatus; radiosondes and rockets are systematically sent aloft; flights are made by special planes and helicopters; much scientific and research work is carried on.

The modern status of aviation meteorology is the subject matter of a scientific conference sponsored by the Main Administration of the Hydrometeorological Service of the Council of Ministers of the USSR which opened yesterday in Moscow. The conference is being attended by representatives of the Civil Air Fleet of the USSR and by military aviators.

Brief introductory remarks about the opening of the conference were delivered by K. T. Logvinov, Deputy Chief of the Main Administration of the Hydrometeorological Service of the USSR. Then N. Z. Pinus, D. L. Laykhtman, and a number of other comrades delivered reports on atmospheric turbulency, the cause of "bumps" in flying.

Over a period of five days of work the conference will hear and discuss reports on these subjects: prediction of winds and clouds at different heights, predictions of thunderstorm conditions, the influence of meteorological factors on the operation of modern aircraft and the status and prospects for development of instrumental observations aboard aircraft and at airdromes.

("Conference on Aviation Meteorology," Sovetskaya Aviatsiya, 28 June 1960, p. 4)

#### Test Run of the Weather Ship "Yu. M. Shokal'skiy"

The expeditionary ship "Yu. M. Shokal'skiy," cutting through the waves, departed from the shores of Crimea. This was the first test run of the new Soviet vessel; the ship was built at the I. I. Nosenko shipyards in Nikolayev on the order of the Main Administration of the Hydrometeorological Service of the Council of Ministers of the USSR. Soviet scientists are using this ship to begin the next attack on the upper layers of the atmosphere.

The ship's radio begins to operate:

"Attention! A meteorological rocket will be launched in 1 1/2 hours!"

On a stand situated in the center of the storeroom the main part of the rocket is joined to a nose cone containing scientific instruments. From the upper layers of the atmosphere they will send signals to those aboard, telling about air temperature, change in pressure, and many other things.

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By use of rockets Soviet scientists have succeeded in establishing that with increasing height above the Earth's surface the temperature of the air surrounding our planet changes sharply. At first it drops at an even rate -- the atmosphere ceases to feel the warm "breathing" of the Earth. Then a cold zone begins where there are frosts of 55°-65° Celsius. However, after 20 km the temperature begins to rise and reaches +15°. This is the influence of ozone, the wonderful gaseous shield of our planet. The ozone layer protects all living things from fatal ultra-violet rays.

The rocket is assembled and is now being moved to the deck on the ship's prow.

It is thirty minutes before launching time. The scientific instruments in the nose cone are activated.

Five minutes before launching. The launching apparatus evenly raises the latticework carriage toward the Sun.

The ship's radio again calls "Attention. It is only sixty seconds to the launching of the meteorological rocket! Thirty seconds! Fifteen seconds -- make ready!"

Beginning at this command the signals from aboard the rocket are recorded on movie film.

"Five seconds... two... one... fire!"

A fiery column rises upward. The rocket has been fired into the zenith.

The immense metal dish of the radar apparatus begins to rotate; by using such apparatus scientists "watch" the flight of the weather scout. The rocket sends signals from heights of more than 70 km. Then the nose cone is separated and slowly descends earthward. During this entire period the instruments transmit scientific information to the ship.

Five such launchings of meteorological rockets were made several days ago from aboard the "Yu. M. Shokal'skiy" in the Black Sea. All launchings went off successfully and the scientists collected interesting data.

Rockets -- those marvels of modern technology -- are not used in our country for war but for the advancement of science. (The 3 photographs show the launcher on the prow, the launcher before release of the rocket, and the instrument control panel.) ("A Rocket Studies the Weather," Nedelva, No. 16, 12-18 June 1960, p. 7)

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A Method for the Analysis of the Near-Surface Vertical Component of Wind Velocity

A. S. Gurvich, an associate of the Institute of Physics of the Atmosphere of the Academy of Sciences of the USSR, is the author of a specialized paper on the subject of the investigation of frequency spectra of the vertical component of wind velocity in the near-surface layer of the atmosphere. Measurements of the spectra of the vertical

component of wind velocity were made in August and September 1958 in the vicinity of the village of Tsimlyanskiy on a level sector of open steppe. A total of about 100 spectra were recorded at heights of 1 and 4 meters.

Gurvich's article describes the instruments and formulae used in his observations. ("Experimental Investigation of Frequency Spectra of the Vertical Component of Wind Velocity in the Near-Surface Layer of the Atmosphere," by A. S. Gurvich, Doklady Akademii Nauk SSSR, Vol. 132, No. 4, 1960, pp. 806-809)

Photo of Shipborne Meteorological Rocket Published in Soviet Journal

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The following caption accompanies a photograph of a meteorological rocket carried aboard the research vessel "Yu. M. Shokal'skiy":

"The other day the Soviet research vessel 'Yu. M. Shokal'skiy' made a test run in the Black Sea along the shores of the Crimea. Five meteorological rockets were launched into the upper layers of the atmosphere from aboard this vessel. In the photo: a meteorological rocket before launching."

(Untitled photograph, *Ekonomiceskaya Gazeta*, 18 June 1960, p. 1)

An Acoustical Method for Measuring the Temperature of the Stratosphere

The following is the full text of a brief article appearing in the *Ekonomiceskaya Gazeta*:

"We are now transmitting the weather report." Scarcely are these words heard and everyone stops and listens, as if they were in no great hurry. And how critical is the opinion if the prediction is incorrect! The fact is that the proper prediction of the weather depends to a high degree on how precisely it is possible to learn the air temperature of the entire atmosphere for a distance of 25 to 30 km above the Earth's surface. The riddle of atmospheric phenomena at this height is now being investigated by radiosondes. These instruments are sent aloft by means of hydrogen-filled balloons and their readings are transmitted to Earth by radio.

Unfortunately this information, especially about temperature, is not exceptionally accurate. Already at a height of 10 km there begins an influence by radiation and a considerable worsening of thermal exchange between the thermometer and the surrounding air. At these heights air density decreases approximately 10 times for each 16 km. As a result of the increase in radiation the thermometer is overheated; therefore the data received at the Earth's surface do not give air temperature but the temperature of the "body" of the instrument itself. Approximately the same thing occurs as with a thermometer in a solar oven.

A solution to this problem has been provided by the workers of the Radiophysical Laboratory of the Institute of Physics of the Atmosphere of the Academy of Sciences of the USSR. They have developed a special instrument called an acoustic thermometer. Temperature is measured by means of sound; the speed of sound depends on air temperature.

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This method has been used for the first time in the history of aerology.

The new instrument consists of two units. In one of them there is a transmitter and two microphones of special design. In the other is a generator and an electronic circuit for the measurement of the time of propagation of the sound. Therefore, by knowing the time elapsing between the sound at the transmitter and its arrival at the microphone, it is possible to determine air temperature precisely.

The new apparatus has already been carried aloft into the stratosphere on a number of occasions and has accomplished its research mission there. It rose to a height of 28 km and after "drift" it returned to Earth by parachute.

The lifting of the apparatus into the stratosphere was accomplished by an automatic stratostat designed by the Central Aerological Observatory.

The first "observations" made with the acoustic thermometer have already proven of great practical value. Because of low inertia the apparatus is able to record sharp changes of temperature in the lower atmosphere and to establish that at those heights there is so-called turbulency (the chaotic movement of individual air particles). This is very important for flights by aircraft at these heights and also for the propagation of radio waves.

Now the developers of the new apparatus are continuing to work on its further perfection, making it lighter and more compact. ("Sound Measures the Temperature of the Stratosphere," by Ye. Laktionov, *Ekonomicheskaya Gazeta*, 17 June 1960, p. 4)

#### IV. SEISMOLOGY

##### Listing Made of Kamchatkan Seismic Stations in Soviet Newspaper

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"Petropavlovsk, Kamchatka. 23 June. On the steep green slope of the Petrovskaya volcano, which rises in the center of the city, there is a massive and conspicuous building. This is the new seismic station of the Institute of Physics of the Earth of the Academy of Sciences of the USSR; it was built in accordance with a special design for sites with high seismicity. It is equipped with modern apparatus for the determination of both nearby and distant subterranean shocks."

"In addition to the Central Seismic Station, other stations are presently observing subterranean shocks on Kamchatka. These include the volcanological station situated in the village of Klyuchi, the special seismic observation point in the Kamchatka River valley, the Pauzhetskaya Geophysical station on the southwestern coast of the peninsula, and the Petropavlovsk station of the tsunami service. This extensive network makes it possible to better predict possible earthquakes and manifestations of volcanic activity on the peninsula."

("They Listen to the 'Pulse' of the Earth," Izvestiya, 24 June 1960, p.3)

##### Microseismic Observations Usable for the Tracking of Low Pressure Areas

An interesting aspect of the study of microseisms is the possibility of their correlation with meteorological conditions. Numerous observations of microseisms can be used to help give us a better understanding of cyclonic and storm processes.

By determining the foci of microseisms and tracing their paths it is possible to determine the position of a cyclonic region -- something highly useful for meteorological forecasting. This article studies the method as applied to observations made during the International Geophysical Year.

A series of graphs and sketch maps is presented to show this method applied to the tracking of a low pressure system in the upper middle latitudes of the Northern Hemisphere in the period 16-19 January 1958.

The author, a worker at the Makhachkala Seismic Station of the Institute of Physics of the Earth, conducted this research under the direction of Ye. F. Savarenkiy. ("On Several Cases of Excitement of Microseisms in the Atlantic and Pacific Oceans," by V. N. Tabulevich, Doklady Akademii Nauk SSSR, Vol. 132, No. 4, pp. 814-817)

##### Bulgaria Registers Earth Tremors

A CTK (Ceskoslovenska tiskova kancelar, Czechoslovak News Agency) dispatch from Sofia, appearing in source, contains the brief information that on 26 May 1960, a strong earthquake was registered in Sofia. The epicenter of the quake was measured at 350 kilometers southwest of the Bulgarian capital. ("Strong Earth Quake Registered in Sofia," unsigned news dispatch, Prague, Obrana Lidu, 27 May 60, p 1)

V. OCEANOGRAPHY

Radio Reports from the "Akademik Vavilov" and "Persey-2"

"Izvestiya" has communicated by radio with the crews of Soviet scientific research vessels now sailing the seas and oceans of the world; we have asked them to tell about the progress of their expeditionary work and about the interesting discoveries made by their scientists.

The first radiograms received in reply are reproduced below:

"Akademik Vavilov": Our expedition departed from Odessa with an oceanographic expedition of the Academy of Sciences of the USSR on board. Our expedition is conducting research in accordance with the International Geophysical Cooperation Program. Captain Dmitriy Chekmasov is sailing his ship into the central and northern parts of the Mediterranean Sea. Our first surprise awaited us along the route to our work area: we discovered a previously unknown shoal 22 meters deep in the Aegean Sea. The expedition is continuing its observations. The voyage is progressing successfully. -- V. Petelin, Expedition Chief.

"Persey-2": The task of our expedition is the determination of the extent of penetration of the cold waters of the Sea of Norway into the Atlantic Ocean and vice versa -- the penetration of the deep waters of the Atlantic into the Sea of Norway through the Faeroe-Iceland threshold.

Such oceanographic research has been sponsored by the International Council for the Study of the Seas. In recent work the English and Soviet scientists have indicated that such an exchange of water does in fact take place. This refutes a theory prevailing since the time of Nansen.

Operations are presently being conducted in which the ships of nine different countries are participating. They are sailing on parallel traverses with a 10-mile interval from the Faeroe Islands to Iceland. Each 15 to 20 miles measurements are made of water temperature and salinity; oxygen content and the presence of other elements is also determined. In each of the three work cycles there are more than 300 such scientific stations.

The last cycle is now being completed. The vessel will soon return to Westmanhavn; there, under the direction of the leading Scottish oceanographer Doctor Tate, the observational results will be discussed.

The "Persey-2", assigned to one of the most difficult sectors of the northwestern part of the Faeroes, is successfully completing its observations. The expedition leader, Doctor Tate, was highly appreciative of our work and has expressed his gratitude to the Soviet seamen. He emphasized that such major research can be accomplished only by the joint efforts of a number of countries and that such joint work is in the interest of peace and progress. -- M. Adrov, Chief of Expedition, Candidate in Geographical Sciences.

("Radio Reports from Scientific Ships," Izvestiya, 22 June 1960, p. 6)

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Soviets Explore Fisheries and Conduct Oceanographic Research in the Gulf Of Guinea

The Journal Priroda reports that an expedition visited the western shores of Africa at the end of 1958 and the beginning of 1959. Its purpose was the study of new regions in which sardines and other fish can be caught and for making a series of biological and oceanographic investigations. The expedition departed from Kerch on three vessels; after passing through the Straits of Gibraltar it proceeded through the Gulf of Guinea to the shores of Ghana. In a four-month period the vessels travelled 14,000 miles; the results were a valuable commercial take of fish and important scientific research.

In the first half of November the ships travelled southwestward over the continental shelf along the coasts of Africa. The flagship of the flotilla, the trawler "Zhukov'skiy," was engaged in catching fish, while the vessel "Grot" searched for fish by hydroacoustic instruments.

Between Cape Verde and the mouth of the Gambia River the expedition discovered many sardines and this region was investigated in greater detail. In 12 days the expedition caught several dozen tons of sardines and accomplished a series of biological and oceanographic investigations.

Near Cape Verde the fish were found at the bottom, but in the vicinity of the mouth of the Gambia River they were found in the surface layers. For a period of several days dozens of large shoals of sardines moved southward at the surface of the water.

At the end of November the ships proceeded from the mouth of the Gambia River to the south and southeast along the shores of Africa. The ships stopped at the mouth of the Casamance River, at Conakry and Freetown, and opposite the Ivory Coast in search of fish.

Not far from the Equator, along the coasts of Ghana, the expedition again encountered a dense shoal of sardines; during December there was a successful catch. The sardines were concentrated over the edge of the shelf approximately 30 miles from the coast at depths of 65 to 85 m. During the day they are concentrated at the bottom and in the evening rise to the intermediate layers of water and remain there until morning.

While the trawler "Zhukovskiy" was catching fish, the "Grot" watched the movements and studied the oceanographic and biological conditions of the region.

By January 1959 the expedition had filled its quota and headed for the port of Takoradi in Ghana for fuel, fresh water and fresh supplies. On 14 February, after four months at sea, the expedition returned to Kerch, having voyaged a total of 14,000 miles. ("To the Shores of Africa," by D. V. Bogdanov, Priroda, No. 4, 1960, pp. 79-84)

Further Research Report from the "Vityaz'" Appears in Soviet Journal

Another in a series of articles on the oceanographic research conducted by the vessel "Vityaz'" in the central part of the Pacific Ocean has now appeared in the Doklady (Reports) of the Academy of Sciences of the USSR. The present report deals with the distribution of copepoda in the tropical biogeographic region.

The article indicates that the central part of the Pacific Ocean is distinguished by the following basic types of vertical distribution of copepoda. 1 -- Forms found in the near-surface layer; 2 -- Forms found in the upper part of the surface zone; 3 -- Forms found in the lower part of the surface zone; 4 -- Forms found in the surface zone, with great range of diurnal migrations; 5 -- Bathypelagic forms; 6 -- Forms found in the deep-water zone. These different layers are described in some detail and comparisons are made between stratification in the tropical and temperate seas. ("Principal Types of Vertical Distribution of Copepoda in the Central Part of the Pacific Ocean," by A. K. Geynrikh, Doklady Akademii Nauk SSSR, Vol. 132, No. 4, 1960, pp. 921-924)

## VI. ARCTIC AND ANTARCTIC

### Report on the First All-Union Conference on Antarctic Oceanography

The First All-Union Conference on Antarctic Oceanography is bringing its work to a conclusion today. It has been devoted to the results of the solution of problems associated with the study of the physical and geological phenomena of Antarctica, problems of the dynamics and thermal regime of Antarctic waters, wind and ice, and the hydro-graphic characteristics of the coastal zone, etc.

The conference summed up the results of the extensive research conducted in inaccessible regions by the Soviet Union and the scientific expeditions of other countries.

A great deal of interest was shown in a report made by M. P. Shesterikov, a hydrologist who had spent the winter at Mirnyy; he described calculations of predictions of freezing of the Davis Sea. It is on the shores of the Davis Sea that the South Polar station "Mirnyy" is situated. These calculations are helpful in navigation. A report of no less practical value was made by G. V. Rzheplinskiy, a scientist associated with the Oceanographic Institute; his subject was that of wind turbulency in Antarctica.

The geology of Antarctica is one of the most interesting riddles of the globe. Tropical forms of corals grew in the geological past in the now severe waters surrounding Antarctica. The shores of the icy continent were covered by ageless forests; this is demonstrated by the immense deposits of coal extending as far as 85° S. Bottom sediments have been studied by marine geologists. Spores and pollen of many woody plants have been found in the bottom sediments: birches, pines, various kinds of palms, nut-bearing trees and various grasses. ("Antarctic Oceanography," *Ekonomicheskaya Gazeta*, 23 June 1960, p. 1)

### Brief Notes from Antarctica

-- The mean air temperature in the second half of January at the station Vostok was -33.7° and on the coast, at the station Lazarev, it was -3.8°.

-- There has been a complete turnover of personnel at Soviet stations in the Antarctic. Polar duties have been assumed at the Mirnyy Observatory and at the stations of Komsomol'skaya, Vostok and Lazarev by participants of the Fifth Soviet Complex Antarctic Expedition. Scientific observations are in full swing for completion of all parts of the program: meteorology, aerology, actinometry, geophysics and glaciology.

-- In contrast to previous expeditions, devoted primarily to the study of the region of Eastern Antarctica adjoining the coastline of the Indian Ocean, extensive work is being done on the Atlantic coast.

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-- Six foreign scientists have arrived for work at Soviet stations: three German, two Czech and one American. A Soviet glaciologist, S. Yevteyev, will work at McMurdo station.

-- An IL-14 aircraft has made a non-stop flight from Lazarev to Mirnyy over the interior parts of the continent.

-- The geological-geographical detachment of the expedition has established two permanent tent camps in the mountains of Queen Maud Land at an elevation of 1,500 m above sea level. A geological map of a mountainous zone 250 km long and 35 km wide has been compiled at a scale of 1:2,000,000.

-- A sledge-tractor traverse was made to the Princess Astrid Coast for exploration of the region situated to the south of Lazarev station. The traverse was 110 km long; along this route the train made regular seismic soundings and made other scientific observations.

-- N. A. Lepilova, Interdepartmental Committee for the Study of Antarctica of the Academy of Sciences of the USSR (Moscow). ("News from the South Polar Continent," Priroda, No. 4, 1960, p. 42)

Reports from the Antarctic and Arctic

Antarctic: "Now, when you have the height of summer there at home in Russia, it is the middle of winter here in Antarctica. Today is the winter solstice. It is being observed at all Antarctic stations as an unusual sort of holiday."

"The polar night prevails at the stations of Lazarev and Vostok. There are frosts of 80-82 degrees at the Vostok station."

"A small amiable group at Vostok station under the Komsomol Sidorov is thoroughly fulfilling its extensive program of scientific research. Our 'citizens of Vostok' are living in warm, well-built huts and are working in well-equipped scientific pavilions."

"The Lazarev station, directed by Candidate in Geographical Sciences Dubrovin, is situated on the coast of Queen Maud Land. An extensive program of scientific observations is being carried on at that point. This requires great efforts and endurance. At this station there are Antarctic 'hurricanes' with wind velocities often attaining 150-180 km per hour."

"Scientific research at the Mirnyy Observatory is being conducted thoroughly and routinely. Geophysical research is continuing. Meteorological and aerological observations are being made from day to day, in every kind of weather, without interruptions. The geological-geographical detachment which during the last summer and fall season had conducted much field work in the mountains of Queen Maud Land is now busy with the office processing of the collected material."

"The arrival of winter -- the most difficult period in Antarctica -- has not put an end to field research. Three mobile stations are operating in the coastal region. Our airmen made their establishment possible. Due to the bad weather it required 1 1/2 months for these stations to be landed at their sites. The 'Druzhba' station is operating at a distance

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of 300 km from Mirnyy on the western shelf ice. The following are working at that station: the scientists Dergach and Kostka, and the radio technician Kazadayev. The 'Mir' station is 90 km from Mirnyy. It is situated on the ice island Drigal'skiy; working at that station are the scientists Skayb, Smirnov, and Karpushkin. The station 'Pobeda' is situated on an ice island 350 km to the northeast of Mirnyy; the Antarctic watch at this station is entrusted to the scientific workers Deryugin and Kalikhman and the radio technician Skripko."

"Thousands and thousands of kilometers separate us from our Motherland, but we do not feel cut off. The radio brings us news from our native land. Together with all the Soviet people we are rejoicing at the unprecedented achievements of our country, the successes of the USSR in the struggle for peace." -- Ye. Korotkevich, Chief of the Fifth Complex Antarctic Expedition, Mirnyy, 22 June (by telegraph).

Arctic: "It is now summer at the station 'Severnnyy Polus-8'. The temperature at all times is about 0° C and the snow is melting rapidly. It has become difficult to move about on the floe: the snow has become rotten and there is water underneath. The men sink down when walking and the use of a tractor is out of the question. Therefore the chief task of the group at this time is contending with melt water. At any time it may make its way into the working or living quarters or provision warehouses. It has already been necessary to move some huts and tents that have been threatened with flooding to new sites."

"However strange it may seem, we are reminded of the desert; we have dug a real 'irrigation' system in the ice. To be sure, it was not for carrying water to us, but rather for carrying melt water away from the vicinity of the camp."

"The atmosphere is probed twice each day by a group of aerologists headed by G. Zinov'yev. In mid-May one of the radiosondes rose to a height of 41,000 meters. In accordance with the unwritten law prevailing among the polar workers it was necessary for those on duty to break out a bottle of brandy; at the beginning of June a balloon attained a height of 45,000 meters. Once again those on duty had to pass out brandy -- fourteen glasses of it."

"The meteorologist and actinometric specialist V. Ryzhikov was constantly alert. He is responsible for keeping track of all the changes of the capricious Arctic weather."

"The young engineer-hydrologist V. Yevseyev is measuring the depth of the ocean, determining the speed at which the floe is drifting, the velocity of the current beneath the ice, and the temperature and salinity of the water."

"Every day after dinner all the men who are off-duty gather in the dayroom. There are jokes and hearty laughter. On Saturday and Sunday an open vote is taken to determine what film will be shown."

"This is the way it goes in the third month in which our young group is living and working on the drifting ice floe as it moves along in the limitless expanses of the Arctic Ocean." -- N. Blinov, Chief of the station "Severnnyy Polus-8". ("News from the Poles of the Earth,"

Izvestiya, 23 June 1960, p. 6)

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